

REMARKS

In response to the Office Action of June 17, 2003, Applicants have amended the claims, which when considered with the following remarks, is deemed to place the present application in condition for allowance. Favorable consideration of all pending claims is respectfully requested.

In the first instance, Applicants through the undersigned, thank Examiners Collins and Nelson for their time and consideration in granting a personal interview on October 14, 2003.

Applicants additionally thank Examiner Collins for the helpful suggestions and guidance provided during the course of the interview. The claims have been amended based on the substance of the interview and the Examiners Collins and Nelson indicated that the claims as presently amended would be favorably considered.

Claims 2, 5, 7-11, 14, 17, 21, 24-25, 27, 30, 36-41, 43-45, 47-50 and 52-57 have been rejected under 35 U.S.C. § 112, first paragraph, as allegedly directed to non-enabled subject matter. According to the Examiner, while the specification is enabling for methods of using a nucleotide sequence encoding a plant cyclin-dependent kinase inhibitor which binds a plant CDC2a cyclin-dependent kinase, the specification is not enabling for the same methods using a cyclin-dependent kinase inhibitor from any source which binds a CDC2a cyclin-dependent kinase obtained from any source. According to the Examiner, since cyclin-dependent kinase inhibitors and cyclin-dependent kinases obtained from distantly related groups of organisms may not be able to functionally interact, obtaining the desired effects in transgenic plants is unpredictable using a nucleotide sequence encoding a cyclin-dependent kinase inhibitor obtained from any source that binds to a CDC2a cyclin-dependent kinase obtained from any source.

In response to the rejection and in order to advance prosecution of this application, claims 2, 5, 7, 11, 14, 17, 21, 25, 27, 30 and 36 are presently amended to recite in

relevant part: "a plant cyclin-dependent kinase having a PSTAIRE cyclin-binding motif."

Support for this amendment may be found throughout the specification, e.g., page 5, lines 19-21, and Example 2, final sentence. The same claims are also presently amended to recite in relevant part: "wherein the CKI comprises an amino acid sequence of at least one of SEQ ID NO:34, SEQ ID NO:35 or SEQ ID NO:36 or any of the aforementioned amino acid sequences having one mismatch at any position." Support for this amendment may be found throughout the specification, e.g., page 53, lines 5-18.

Support for the language "or any of the aforementioned amino acid sequences having one mismatch at any position" may be found throughout the specification. *See e.g.,* the way in which the motifs are described on page 56 of the application. *See also* the way in which the SEQ ID NOs for the motifs are presented, which allow for variation. In fact, Table 2 of the application provides basis for mismatches other than those covered by the strict limitations of SEQ ID NO: 34 to SEQ ID NO: 39. Thus, the motifs represented by SEQ ID NO: 34, SEQ ID NO: 35 and SEQ ID NO: 36 do not, in some instances, cover the motifs as they appear in the various ICKs (see Table 2) unless one mismatch is taken into account. For example, the CKIs indicated below would not fall within the scope of the consensus sequences SEQ ID NOs. 34, 35, or 36 unless one mismatch is taken into account.

SEQ ID NO: 34 {FX₂KYNFD}

Arabidopsis CKI2 (=FL39) contains 1 mismatch within this consensus sequence (see Table 2 for ICK2:motif 1 in which the first amino acid is indicated as a C). This situation is not covered by the way in which SEQ ID NO: 34 is currently formulated, which only allows for the first amino acid to be an F. Therefore, without accounting for one mismatch, CKI2 would not be covered by

the claims when directed towards this particular consensus sequence. Applicants draw the Examiner's attention to FL67 (which contains 2 mismatches) which protein will not be covered by the claims as presently amended.

SEQ ID NO: 35 {[P/L]LXGRYEW}

Arabidopsis CKI2 (=FL39) contains 1 mismatch within this consensus sequence (see Table 2 for ICK2:motif 2 in which the second amino acid is indicated as an G, whereas according to the sequence represented by SEQ ID NO: 35, the only possibility for an amino acid at this position would be an L). Therefore, without accounting for one mismatch, CKI2 would not be covered by the claims when directed towards this particular consensus sequence. Similarly, see Table 2 for ICK4:motif 2 in which the sixth amino acid is indicated as an F, whereas according to the sequence represented by SEQ ID NO: 35, the only possibility for an amino acid at this position would be an Y). Therefore, without accounting for one mismatch, CKI4 would not be covered by the claims when directed towards this particular consensus sequence. See also Table 2 for the *Chenopodium* ICK2:motif 2 in which the penultimate amino acid is indicated as a D, whereas according to the sequence represented by SEQ ID NO: 35, the only possibility for an amino acid at this position would be an E). Therefore, without accounting for one mismatch, this CKI would not be covered by the claims when directed towards this particular consensus sequence.

SEQ ID NO: 36 {EXE[D/E]FFX₃E}

Arabidopsis ICK4 (=FL67) and the alfalfa sequence each contain 1 mismatch within this consensus sequence. See Table 2 for ICK4: motif 3, in which the third amino acid is indicated as

a D. Therefore, without taking into account one mismatch, CKI4 would not be covered by the claims when directed towards this particular consensus sequence. See also Table 2 for the alfalfa sequence: motif 3, in which the sixth amino acid is indicated as a C, which is not allowed by the current form of SEQ ID NO: 36. Therefore, without taking into account one mismatch, the alfalfa CKI would not be covered by the claims when directed towards this particular consensus sequence.

Applicants respectfully submit that the claims as presently amended to comprise the consensus sequences SEQ ID NOs. 34-36 as well as such consensus sequences having one mismatch, do not unduly broaden the scope of the claims. Applicants also respectfully submit that during the interview, Examiners Collins and Nelson expressed concern that the claims might cover hitherto unknown plant sequences that would correspond to p21s and p57s from animals. We confirm that the motifs, even when taking account of one mismatch, and when blasted against public databases do not bring up any p21- or p57-type sequences. In addition, Applicants have checked p21 and p57 from mouse and human and neither have been found to contain the structural domains defined in the claims.

Applicants have also amended claim 52 to recite SEQ ID NOs: 4 and 6, as well as amended claim 53 to recite SEQ ID NOs: 3 and 5. SEQ ID NOs: 3, 4, 5, and 6 were the subject of a restriction requirement and were thus non elected for prosecution in the present application (SEQ ID NOs: 1 and 2 were elected). As indicated on the copy of the Summary Interview attached to the Office Action, the Examiner has indicated that she will consider rejoining previously restricted groups upon submission of data for two additional CKIs disclosed in the specification. Submitted herewith is a declaration under 37 C.F.R. § 1.132 demonstrating

results obtained for transgenic plants transformed with a nucleic acid molecule encoding different CKIs. In particular, transgenic plants expressing CKIs corresponding to CKI6, CKI7, CKI3, and CKI4 show a similar phenotype of altered leaf shape, and stunted growth. Thus, in addition to CKI2 (ICK2 or KRP2) exemplified by the application, as well as data submitted in the amendment dated March 24, 2003, corresponding to the CKIs KRP6 and KRP7, Applicants have now presented the Examiner with even more evidence that the presently claimed invention was fully enabled as of the effective filing date of the present application.

In view of the amendments to these claims, withdrawal of the rejection of claims 2, 5, 7-11, 14, 17, 21, 24-25, 27, 30, 36-41, 43-45, 47-50 and 52-57 under the enablement provision of 35 U.S.C. § 112, first paragraph, is respectfully requested.

Claims 2, 5, 7, 11, 14, 17, 21, 25, 27, 30, 36, 56 and 57 and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in the recitation of "Cdc2a". As presently amended, claims 2, 5, 7, 11, 14, 17, 21, 25, 27, 30 and 36, and claims dependent thereon, no longer recite "Cdc2a" but instead recite "plant cyclin-dependent kinase having a PSTAIRE cyclin-binding motif." Claims 56 and 57, which depend from claim 36, also no longer recite "Cdc2a." Withdrawal of the rejection of claims 2, 5, 7, 11, 14, 17, 21, 25, 27, 30, 36, 56 and 57 and claims dependent thereon, is therefore respectfully requested.

Claims 2, 11, 27, 37, 45 and claims dependent thereon, have been rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite in reciting "decreasing" and "decreased" due to such terms being relative and lacking a comparative basis. As presently amended, claims 2 and 37 recite in relevant part "decreased cyclin dependent kinase activity relative to a corresponding wild type plant." Claim 11 has been amended to recite in relevant

part: "wherein the regenerated plant has decreased cell number relative to a corresponding wild type plant." Claim 27 has been amended to recite in relevant part: "thereby decreasing endoreduplication and ploidy level in the plant cell relative to a corresponding cell from a wild type plant." Claim 45 has been amended to recite "[t]he transgenic plant of claim 36 having cells with decreased ploidy levels relative to a corresponding wild type plant." In view of the amendments to the claims, withdrawal of the rejection of claims 2, 11, 27, 37, 45, and claims dependent thereon, under 35 U.S.C. § 112, second paragraph, is respectfully requested.

Claims 7, 14, 38 and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in reciting "increasing" and "increased" due to such terms being relative and lacking a comparative basis. As presently amended, claim 7 recites in relevant part: "thereby increasing plant cell size relative to a corresponding wild type plant." Claim 14 is presently amended to recite in relevant part: "wherein the regenerated plant has increased leaf serration relative to a corresponding wild type plant." As amended herein, claim 38 recites: "[t]he transgenic plant of claim 36 having an increased level of CKI relative to a corresponding wild type plant." Withdrawal of the rejection of claims 7, 14, 38 under 35 U.S.C. § 112, second paragraph, and claims dependent thereon is therefore warranted.

Claims 21, 25, 43, 44, 47 and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in reciting "reducing" and "reduced" due to such terms being relative and lacking a comparative basis. As presently amended, claim 21 recites in relative part: "wherein the regenerated plant has flowers with reduced petal size relative to a corresponding wild type plant." Claim 25 is amended to recite in relevant part: "wherein the regenerated plant has leaves with reduced leaf venation relative to a corresponding wild type plant." As presently amended, claim 43 recites in relevant part: "having flowers with

reduced petal size relative to flowers of a corresponding wild type plant." Claim 44 is presently amended to recite in relevant part: "having reduced leaf venation relative to leaves of a corresponding wild type plant." As presently amended, claim 47 recites "[t]he transgenic plant of claim 36 having reduced seed size relative to a corresponding wild type plant." In view of these amendments, withdrawal of the rejection of claims 21, 25, 43, 44, 47 and claims dependent thereon under 35 U.S.C. § 112, second paragraph, is therefore respectfully requested.

Claims 24, 52, 53 and 54, and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite for depending from cancelled claims. Claim 24 is presently amended to depend from claim 21 rather than claim 19. Claims 52, 53, and 54 are also presently amended so that they no longer depend from cancelled claims. Withdrawal of the rejection of claims 24, 52, 53 and 54 under 35 U.S.C. § 112, second paragraph, is therefore warranted.

Claim 36 and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in reciting "resulting from the transgene." In addition, the same claims remain rejected under section 112, second paragraph, as allegedly indefinite in reciting "essentially the same characteristics." As presently amended, claim 36 no longer recites "with essentially the same characteristics resulting from the transgene".

Withdrawal of the rejection of claim 36 under 35 U.S.C. § 112, second paragraph, and claims dependent thereon is therefore respectfully requested.

Claim 39 and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph as allegedly indefinite for reciting "altered." The Examiner's position is

that leaf size may be altered in more than one way such as an increase in thickness, thinness, or surface area. Also according to the Examiner, "altered" is a relative term which lacks a comparative basis. In response to the rejection of claim 39, Applicants have amended the claim to recite "[t]he transgenic plant of claim 36 having altered leaf shape relative to a corresponding wild type plant." In view of this amendment, Applicants respectfully request withdrawal of the rejection of claim 39 under 35 U.S.C. § 112, second paragraph.

Claim 54 and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in the recitation of "comprises the consensus amino acid sequence as set forth in any one of SEQ ID NO:34, SEQ ID NO:35, SEQ ID NO:36, SEQ ID NO:37, SEQ ID NO:38 or SEQ ID NO:39." Applicants respectfully submit that presently there are no claims depending from claim 54. As presently amended, claims 2, 5, 7-11, 14, 17, 21, 24, 25, 27 and 30 have been amended to recite SEQ ID NOs:34, 35, or 36. Claim 54 which depends from any one of claims 2, 5, 7-11, 14, 17, 21, 24, 25, 27, or 30, is presently amended to recite in relevant part: "wherein the CKI further comprises the consensus amino acid sequence as set forth in any one of SEQ ID NO: 37, SEQ ID NO:38 or SEQ ID NO:39. Claim 55 has been similarly amended. In view of the amendments to claim 54, withdrawal of the rejection of claim 54 under 35 U.S.C. § 112, second paragraph is respectfully requested.

Claims 56 and 57, and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in the recitation of "comprising the CKI which binds CDC2a that was introduced into the parent plant." According to the Examiner, it is unclear whether the CKI or CDC2a was introduced into the parent plant. In response to the rejection, claim 36 is presently amended to recite in relevant part: "[a] transgenic plant, a variety obtained therefrom, a plant part, or plant cell which comprises a nucleic acid molecule encoding

a plant cyclin dependent kinase inhibitor (CKI) which binds a plant cyclin-dependent kinase having a PSTAIRE cyclin binding motif, wherein the nucleic acid molecule encoding the plant CKI is under the control of a promoter which functions in a plant cell and wherein the CKI comprises an amino acid sequence of at least one of SEQ ID NO:34, SEQ ID NO:35 or SEQ ID NO:36, wherein the nucleic acid molecule encoding a plant CKI is heterologous to the genome of the transgenic plant, or is homologous but additional to the genome of the transgenic plant or has been introduced into the transgenic plant, plant part or plant cell by recombinant DNA means." Claim 56 is presently amended to recite "[h]arvestable parts or propagation material from the transgenic plant of claim 36, comprising the nucleic acid molecule that was introduced into the parent plant." As presently amended, claim 57 recites: [c]ut flowers from the transgenic plant of claim 36, comprising the nucleic acid molecule that was introduced into the parent plant." Withdrawal of the rejection of claims 56 and 57, and claims dependent thereon, under 35 U.S.C. § 112, second paragraph, is therefore warranted.

Claims 2, 3, 36-41, 43-45, 47-50 and 54-57 have been rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent No. 5,550,038 to Goodman et al. in view of Toyoshima et al. (1994) *Cell* 78(1):67-74. Goodman et al. has been cited for teaching the expression in plants of nucleic acid molecules encoding mammalian peptides and the desirability of expressing mammalian peptides in plant systems. Toyoshima et al. has been cited for its teaching of a nucleic acid molecule encoding a murine p27 mammalian cyclin-dependent kinase inhibitor which binds CDC2a and which comprises the consensus amino acid sequence as set forth in SEQ ID NO:34 or SEQ ID NO:35 (page 68, Figure 1, page 69, Figure 3, page 70, Figure

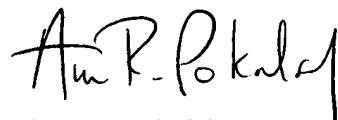
As presently amended, claims 2, 3, 36-41, 43-45, 47-50 and 54-57 recite or depend from a claim that recites a plant cyclin-dependent kinase inhibitor which binds a plant

cyclin-dependent kinase having a PSTAIR cyclin binding motif. Neither reference, taken alone or in combination, teaches or suggests the plant CKI as presently claimed comprising at least one of SEQ ID NO:34, SEQ ID NO:35, or SEQ ID NO:36. Further, neither reference taken alone or in combination teaches or suggests a nucleic acid molecule encoding the presently claimed CKI under the control of a promoter that functions in a plant cell. Nor does Goodman et al. or Toyoshima et al., considered separately or combined, teach or suggest the presently claimed methods for decreasing cyclin-dependent kinase activity in a plant, or transgenic plants comprising a plant cyclin-dependent kinase having a PSTAIR cyclin-binding motif. Absent a suggestion in the cited references for the methods and compositions recited in claims 2, 3, 36-41, 43-45, 47-50 and 54-57 the present invention is not obvious. Withdrawal of the rejection of claims 2, 3, 36-41, 43-45, 47-50 and 54-57 under 35 U.S.C. § 103(a) is therefore respectfully requested.

Claims 2, 5, 7-11, 14, 17, 21, 24-25, 27, 30, 36-41, 43-45, 47-50 and 52-57 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly unpatentable over claims 9, 13-19, 21-23, 43-48 and 51-52 of copending application Serial No. 09/526,597. Applicants respectfully submit that a terminal disclaimer, disclaiming that portion of the term of a patent issuing from the present application, which would extend past the term of a patent issuing from copending application Serial No. 09/526,597, will be submitted upon allowance of the claims presently under consideration in this application.

Accordingly, in view of the amendments to the claims and the foregoing remarks, the present application is believed to be in condition for allowance, which action is earnestly solicited. The Examiner is invited to telephone the undersigned to resolve any remaining issues in this application as expeditiously as possible, eg. by Examiner's amendment.

Respectfully submitted,



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